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<b>(21) International Application Number:</b> PCT/DK92/00367 <b>(22) International Filing Date:</b> 4 December 1992 (04.12.92)  <b>(30) Priority data:</b> 1956/91 4 December 1991 (04.12.91) DK  <b>(71)(72) Applicant and Inventor:</b> OPPENHEJM, Ulrich [DK/DK]; Løjelttegaard, Løjeltevej 16-18, DK-2970 Hørsholm (DK).  <b>(74) Agent:</b> HOFMAN-BANG & BOUTARD A/S; Adelgade 15, DK-1304 Copenhagen K (DK).  <b>(81) Designated States:</b> AT, AU, BB, BG, BR, CA, CH, CS, DE, DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, NZ, PL, RO, RU, SD, SE, UA, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG).		<b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> A TARPAULIN PROVIDED WITH A DECORATION OF A REFLECTING MATERIAL AND A METHOD OF MAKING IT  <b>(57) Abstract</b>  A tarpaulin comprising a fabric coated with a plastics material, preferably PVC, polyamide or polyprene, is provided with a decoration of a reflecting material by anchoring a reflecting sheet to a piece of tarpaulin cloth, whose plastics coating is of the same type as or is compatible with that of the tarpaulin, by high frequency welding or heat application, and then applying the piece of tarpaulin cloth provided with reflecting sheet, optionally formed in the desired shape, to the tarpaulin by hot air fusion. The reflecting sheet is preferably a retroreflecting PVC sheet of the naked prism type which is anchored to the piece of tarpaulin cloth by high frequency welding. Other types of reflective sheet may be applied to the piece of tarpaulin or directly to the tarpaulin by means of an adhesive and anchored thereto by placing a transparent flexible polymeric film on top of the reflecting sheet with its edges extending beyond those of the sheet and high frequency welding it to the piece of tarpaulin or the tarpaulin itself along the edges.		

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A tarpaulin provided with a decoration of a reflecting material and a method of making it

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5 The invention concerns a tarpaulin comprising a fabric coated with a plastics material, preferably PVC, polyamide or polyprene, and provided with a reflecting decoration, as well as a method of providing a tarpaulin with such a reflecting decoration.

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Today tarpaulins usually consist of a fabric coated with a plastics material. The fabric must be strong and durable and is therefore most frequently made of polyester. The plastics coating must likewise be strong and durable, and it must  
15 moreover have a certain toughness and flexibility. It is mostly made of PVC or of a polyamide, such as nylon or aramide, or a polyprene, such as chloroprene rubber. Tarpaulins are used for many cover purposes, e.g. within the building industry, and in particular for covering trucks.  
20 They are also used for making larger tents, e.g. for use in temporary military quarters and refugee camps as well as for public events.

It is common practice to print logos, company names,  
25 slogans, instructions and other decorations on truck tarpaulins, for informative and for advertising purposes. It would be a great advantage, both with respect to the advertising value and the traffic safety, if such decorations could be made of a reflecting material or could  
30 be combined with reflecting stripes or patterns, e.g. along the edges of the tarpaulins. In particular, this could contribute to making the trucks visible at night when the usually dark tarpaulins are otherwise difficult to see. According to UN rules on traffic safety, trucks and trailers  
35 are to be provided with rear truck planks, i.e. usually aluminium plates with yellow reflection, downwardly on the rear end. In general, the ordinary rules are that rearward

reflectors are to be red, lateral reflectors to be yellow and forward reflectors to be white. However, reflectors arranged on the body or chassis of trucks will often be coated with dirt, and even when visible they do not give a  
5 sufficient impression of the size of the vehicle.

Various reflective materials may be considered for application on tarpaulins. Paint or inks containing reflecting pigments are not suitable, partly because they are not  
10 durable exposed to wind and weather. The best reflection effect is obtained with so-called retroreflecting films or sheets, of which substantially two types are known: One is the glass bead type comprising a large number of fine glass beads embedded with specular base in a plastics sheet. The  
15 other is the prism (or cube corner) type with a large number of prism-shaped depressions impressed in one surface of a plastics sheet so that light from the other side is reflected through the sheet. A naked prism type reflecting sheet must have free air at the rear side in order to reflect. A  
20 more recent form of the prism type reflecting sheet is coated with a thin layer of metal such as aluminium on the impressed surface in order to achieve an even better reflection which is not dependent on the background. Another recent form of the prism type reflecting sheet is a multi-  
25 layer sheet provided with a sealing layer behind the air-filled depressions.

It has been attempted to glue a reflective transfer sheet of the glass bead type on a truck tarpaulin, but it was not  
30 durable, and the reflecting sheet rapidly flaked off.

A reflecting sheet of the naked prism type cannot be applied at all in this manner, because there must be air on the rear side (the impressed side) for it to reflect. The normal way  
35 of applying a reflecting sheet of the prism type to a base, e.g. a PVC sheet, in order to seal the rear side is by high frequency welding along the edge of the desired decoration

and, in case of large surfaces, along crisscross lines to divide the face into reflecting sections. Of course, this requires that the reflecting sheet and the base are of the same type or are at least compatible so that they can be welded together by fusion. A corresponding method can be used for fixing a reflecting sheet of the glass bead type on a base if the sheet and the base are compatible. However, it is not practical to use high frequency welding for fixing reflecting sheets on tarpaulins, since this would require that the entire tarpaulin was moved intermittently through the high frequency welding machine or the machine moved intermittently along the tarpaulin carefully positioning the welding tool in each step, which would be very cumbersome with existing apparatus. Further, a reflecting sheet of the uncoated prism type shows the highest reflection with a white or light-coloured background, while tarpaulins often have a dark colour, and a reflecting sheet of the metallized prism type cannot be high frequency welded at all, because the metal layer reflects the microwaves.

A generally used method of fixing a reflecting sheet of the glass bead type on a base is to provide the sheet with a heat activatable glue on the rear side to provide a reflective transfer sheet and adhere it to the base by applying pressure and heat. However, this method cannot be used on tarpaulins, since these cannot be inserted into the existing heat presses for this purpose, and there is no other apparatus by means of which the necessary pressure and the necessary temperature and heating time on a tarpaulin can be achieved.

A last possibility might be to sew the reflecting sheet on the tarpaulin, but this would lead to holes in the tarpaulin, which would make it leaky and would reduce its strength.

The object of the invention is to provide a tarpaulin which is provided with a durable reflecting decoration, without this reducing its strength in any manner, and to provide a practicable method of providing a tarpaulin with such a reflecting decoration.

The tarpaulin of the invention is unique in that it carries a piece of reflecting sheet anchored to a piece of tarpaulin cloth, whose plastics coating is of the same type as or is compatible with that of the tarpaulin, by high frequency welding or heat application, said piece of tarpaulin cloth provided with reflecting sheet, optionally formed in a desired shape, being applied to the tarpaulin by hot air fusion.

The method of the invention is unique in that a reflecting sheet is anchored to a piece of tarpaulin cloth, whose plastics coating is of the same type as or is compatible with that of the tarpaulin, by high frequency welding or heat application, and then the piece of tarpaulin cloth provided with reflecting sheet, optionally formed in the desired shape, is applied to the tarpaulin by hot air fusion.

The tarpaulin on which the reflecting decoration is applied by the method of the invention, may e.g. be made of the above-mentioned materials and preferably consists of a polyester fabric coated with PVC. Such tarpaulins are manufactured by e.g. Duratex A/S, Norgesvej 49, DK-6100 Haderslev, Denmark, under the trade mark "duralak"; by Hammersteiner Kunststoffe GmbH, Rheinstrasse 11, D-5142 Hückelhoven, Germany, under the trade mark "Haku"; and by Sattler Textilwerke OHG, Sattlerstrasse 45, A-8041 Graz-Thondorf, Austria, under the trade mark "Complan PVC". The heaviness of the tarpaulin cloth will usually be 300-1500 g/m<sup>2</sup>, but it may also be more.

The reflecting sheet which is applied is expediently a retroreflecting sheet of the glass bead type comprising a large number of fine glass beads embedded in a specular base in a plastics sheet, or of the prism (cube corner) type with a large number of prism-shaped depressions impressed in the surface of a plastics sheet so that light is reflected through the sheet and optionally coated with a thin layer of metal such as aluminium on the impressed surface or backed by a sealing layer. Retroreflecting sheets of the glass bead type are manufactured i.a. by Minnesota Mining and Manufacturing Company, 2501 Hudson Road, Saint Paul, Minnesota 55101, U.S.A., under the trade mark "Scotchlite® 8710", and by Unitika Sparklite Co., Ltd., Chiyokawa-Cho, Kameoka, Kyoto, Japan, under the trade mark "Unitika MR 3501". Retroreflecting sheets of the naked prism type are manufactured i.a. by Reflexite Corp., 315 South Street, P.O. Box 1200, New Britain, CT 06050, U.S.A., under the trade mark "Reflexite® Vinyl IRE". Retroreflecting sheets of the metallized prism type are manufactured i.a. by Reflexite Corp. under the trade mark "Reflexite® AP 1000". Retroreflecting sheets of the sealed prism type are prepared i.a. by Minnesota Mining and Manufacturing Company under the trade mark "Scotchlite® Diamond Grade" and by Stimsonite Corp., 7542 N. Natchez Ave., Niles, IL 60648-3804, U.S.A., under the trade name "Stimsonite® Series 4200". Preferably, the reflecting sheet is a retroreflecting PVC sheet of the naked prism type.

When the reflecting sheet consists of PVC or another thermoplastic material, which is compatible with the plastics coating of the tarpaulin cloth, it is anchored to a piece, e.g. a band, of tarpaulin cloth by high frequency welding. This is done most conveniently in an automatic high frequency welding machine, where a band of the reflecting sheet put together with a band of tarpaulin cloth is moved intermittently through and welded by means of a band tool, which welds the reflecting sheet in narrow stripes longitudinally

and transversely so that reflecting sections are formed. If reflecting logos are to be applied, use is made of another welding tool which welds along the contour of the logo and is provided with a cutting edge which simultaneously cuts out the welded logo. It is most practical that the machine yields a power of 7-12 kW. Such high frequency welding machines are available from e.g. Kif Parechoc S.A., 19 Rue G.-H. Piguet, CH-1347 Le Sentier, Kanton Vaud, Switzerland, under the trade mark "Kifel"®, and from Evald A. Nyborg A/S, Industriskellet 2, Vassingerød, DK-3540 Lynge, Denmark under the trade mark "Weldan"®.

Retroreflecting sheets of the glass bead type or the metallized or sealed prism type may be difficult or impossible to weld by high frequency. Instead they can be applied to a piece of tarpaulin cloth by means of an adhesive and anchored to said piece and protected by placing a transparent flexible film of a polymeric material compatible with the plastics coating of said piece on top of the reflecting sheet with its edges extending beyond those of the reflecting sheet and high frequency welding it to the piece of tarpaulin cloth along the edges. Then the piece of tarpaulin cloth provided with reflecting sheet is applied to the tarpaulin by hot air fusion.

Thus an embodiment of the tarpaulin of the invention incorporating these types of reflecting sheet showing the highest reflection is unique in that it carries a reflecting sheet of the glass bead type or the metallized or sealed prism type applied to a piece of tarpaulin cloth by adhesion and anchored to said piece and protected by an overlying transparent flexible film of a polymeric material compatible with the plastics coating of said piece, the edges of said film extending beyond those of the reflecting sheet and being high frequency welded to the piece of tarpaulin cloth, said piece being in turn applied to the tarpaulin by hot air fusion.



When the reflecting sheet is of the glass bead type with a heat-activatable adhesive on the rear side, it can be anchored to a piece of tarpaulin cloth by heat application. This is done most conveniently in a conventional heat presse  
5 for transfer of transfers, a piece of reflecting sheet put together with a piece of tarpaulin cloth being heated to 120-180 °C at a pressure of e.g. 276-310 kPa for 5-20 s. Where reflecting bands are to be manufactured, the band of reflecting sheet and tarpaulin cloth may be moved con-  
10 tinuously through a heat presse with pressure bands, e.g. of the mark "Reliant", where they are subjected to the above-mentioned temperature and pressure conditions with a corresponding period of residence.

15 According to the invention, it is particularly expedient that the piece of tarpaulin cloth provided with reflecting sheet is applied to the tarpaulin by means of a hot air apparatus, whose hot air jet is introduced between the under-  
side of the tarpaulin cloth and the surface of the tarpaulin  
20 so that the tarpaulin cloth is fused to the tarpaulin, without the reflecting sheet being damaged. In this connection it is best that the temperature of the hot air jet is 400 -  
600 °C, and the heating time and the pressure to be applied depend upon the temperature and the type of thickness of the  
25 material.

Hot air devices that may be used are known within the field for applying reinforcing bands and edges in the manufacture of tarpaulins and for application of patches and joints in  
30 the repair of tarpaulins. However, in the past it was not possible to apply reflecting sheets by means of such hot air devices, since they would melt the sheet and destroy the reflection effect.

35 Such hot air devices are manufactured by Karl Leister Elektrogerätebau, CH-6056 Kägiswil, Kanton Obwalden, Switzerland, under the trade mark "Leister", both as hand devices,

where the piece of tarpaulin cloth provided with reflecting sheet is pressed firmly against the tarpaulin with a hand roller after heating, and as rolling devices for applying long bands of tarpaulin cloth, where the band provided with reflecting sheet is adhered to the tarpaulin at each end, the mouthpiece of the hot air device is inserted below the edge of the band, and the device is rolled along the band, while a roller mounted on the device moves on top of the band after the mouthpiece and presses the heated band firmly against the tarpaulin.

Although as mentioned previously it is a very cumbersome procedure to weld a compatible reflecting sheet directly to a tarpaulin with existing high frequency welding apparatus, and for some types of reflecting sheet it is in fact unfeasible, it has now been found according to the invention that it is possible to apply a reflecting sheet of the glass bead type or the metallized or sealed prism type directly to a tarpaulin by means of an adhesive and anchor it to the tarpaulin and at the same time protect it by placing a transparent flexible film of a polymeric material compatible with the plastics coating of the tarpaulin on top of the reflecting sheet with its edges extending beyond those of the reflecting sheet and high frequency welding it to the tarpaulin along the edges.

Therefore, another tarpaulin according to the invention is unique in that it carries a piece of reflecting sheet of the glass bead type or the metallized or sealed prism type applied directly to the tarpaulin by adhesion and anchored to the tarpaulin and protected by an overlying transparent flexible film of a polymeric material compatible with the plastics coating of the tarpaulin, the edges of said film extending beyond those of the reflecting sheet and being high frequency welded to the tarpaulin.

The transparent flexible film to be used in the last mentioned embodiments of the tarpaulin of the invention must be made of a polymeric material compatible with the plastics coating of the piece of tarpaulin cloth and the tarpaulin, respectively, and it should be tough, weather resistant and UV stabilized and have a smooth surface. The transparent flexible film may be colourless, or it may be coloured e.g. yellow, red or other desired colour to produce coloured reflections.

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The invention also provides a piece of tarpaulin cloth to which a reflecting sheet is anchored by high frequency welding or heat application to be applied as a reflective decoration to a tarpaulin by hot air fusion.

15

The previously mentioned types of reflecting sheet may be used in this piece of tarpaulin cloth, the preferred type being a retroreflecting PVC sheet of the naked prism type.

20

A special embodiment of this piece of tarpaulin cloth has a reflecting sheet of the glass bead type or the metallized or sealed prism type applied to it by adhesion and anchored to it and protected by an overlying transparent flexible film of a polymeric material compatible with the plastics coating of said piece, the edges of said film extending beyond those of the reflecting sheet and being high frequency welded to said piece.

25

The piece of tarpaulin cloth furnished according to the invention is advantageously in the form of a narrow band which may be wound up in a roll and unwound during the application to the tarpaulin by hot air fusion.

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In the drawings, Figure 1 shows how a band of reflecting sheet 2 and a band of tarpaulin cloth 3 from their respective rolls are moved together through a high frequency welding machine 1 and emerge as a reflective band of

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tarpaulin cloth 4 and wound in a roll. The machine is also provided with a cutting tool 5 cutting suitable lengths of the reflective band, preferably in a weld.

5 Figure 2 shows fusion of a reflective band 4 on a tarpaulin 6 by means of a travelling hot air apparatus 7. The figure shows a fused piece of tarpaulin cloth with reflecting logo 8.

10 Figure 3 shows how bands of reflection sheet 2 and bands of transparent PVC film 4 having a slightly larger width than 2 are laid down, 4 on top of 2, on bands of tarpaulin cloth 3 having at least the same width as 4 and are pressed together by rolls with moderate heating 6 whereafter the  
15 aggregate bands are moved through a high frequency welding machine 1 in which the PVC film is welded to the tarpaulin cloth along the edges extending beyond the edges of the reflection sheet, and emerge as reflective bands 5 which are wound in rolls. The starting bands of reflecting sheet 2 may  
20 be supplied with a protecting band of silicone paper which is then drawn off and wound in rolls 7.

Figure 4 shows how a reflective band 2 of tarpaulin cloth according to the invention is applied to a tarpaulin 1  
25 mounted on a truck, by means of a hot air device 3 with a built-in roll of reflective band.

#### EXAMPLE 1

30 A roll of reflecting sheet of the naked prism type, "Reflex-ite® Vinyl IRE", was high frequency welded on a roll of tarpaulin cloth with a PVC coating, "duralak", in a high frequency welding machine, "Kifel"®, with a power of 12 kW, as shown in Fig. 1. The reflecting sheet is usually available in rolls with a width of 9" (229 mm) or 27" (686 mm),  
35 and the roll of tarpaulin cloth is cut in the same or

slightly greater width from a tarpaulin roll with a normal width of 1400-2000 mm.

5 The band of tarpaulin cloth with welded reflecting sheet is placed on a tarpaulin of the mark "duralak" and fixed at each end with staples. It is fused on the tarpaulin, as shown in Fig. 2, by inserting the mouthpiece of a travelling hot air apparatus of the mark "Leister" from the side inwardly below the edge of the band with the roll on top of  
10 the band, and the apparatus is moved along the band, while hot air at a temperature of 400-600 °C is blown below it. The roll presses the fused surfaces together so that this side of the band is welded to the tarpaulin. Then the procedure is repeated on the opposite side of the band.

15 The tarpaulin is thus provided with a reflective band which works homogeneously with the tarpaulin at stretching; temperature changes, high pressure flushing and the like and lasts for the life of the tarpaulin.

20

#### EXAMPLE 2

A band of polyester metallized prism type reflecting sheet, "Reflexite® AP 1000", is applied to a wider band of tarpaulin cloth with a PVC coating, "duralak", by means of a  
25 semiviscous PVC adhesive. On top of the reflecting sheet is applied a transparent, colourless or coloured, flexible PVC film of a slightly larger width than the band of reflecting sheet with its edges extending beyond those of the reflecting  
30 sheet, and the film is adhered to the reflecting sheet by moderate heating while pressing out any air bubbles. The band of tarpaulin cloth is most preferably white when the transparent film is colourless or else the same colour as the transparent film for "cosmetic" reasons.

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Thereafter, the aggregate band is moved through a high frequency welding machine, "Kifel"® in which the transparent PVC film is welded to the tarpaulin cloth along the edges.

- 5 When the resulting reflective band is applied to a tarpaulin by hot air fusion and is cut off at the ends, the end portions may be sealed by fusing a strip of plain tarpaulin cloth or transparent PVC film across the end portion. Another solution may be to stamp out and peel off about 1
- 10 cm of reflecting sheet from the liner of silicone paper for each standard length of reflecting sheet before it is applied to the band of tarpaulin cloth, thus preparing lateral stripes to be welded in the high frequency welding machine.

## P A T E N T   C L A I M S

1. A tarpaulin comprising a fabric coated with a plastics material, preferably PVC, polyamide or polyprene, and provided with a decoration of a reflecting material, CHARACTERIZED in that it carries a piece of reflecting sheet anchored to a piece of tarpaulin cloth, whose plastics coating is of the same type as or is compatible with that of the tarpaulin, by high frequency welding or heat application, said piece of tarpaulin cloth provided with reflecting sheet, optionally formed in a desired shape, being applied to the tarpaulin by hot air fusion.
2. A tarpaulin according to claim 1, CHARACTERIZED in that it comprises a polyester fabric coated with PVC.
3. A tarpaulin according to claim 1 or 2, CHARACTERIZED in that the reflecting sheet is a retroreflecting sheet of the glass bead type comprising a large number of fine glass beads embedded with a specular base in a plastics sheet or of the prism (cube corner) type with a large number of prisms impressed in the surface of a plastics sheet so that light is reflected through the sheet.
4. A tarpaulin according to claim 3, CHARACTERIZED in that the reflecting sheet is a retroreflecting PVC sheet of the naked prism type.
5. A tarpaulin according to claim 1, CHARACTERIZED in that it carries a reflecting sheet of the glass bead type or the metallized or sealed prism type applied to a piece of tarpaulin cloth by adhesion and anchored to said piece and protected by an overlying transparent flexible film of a polymeric material compatible with the plastics coating of said piece, the edges of said film extending beyond those of the reflecting sheet and being high frequency welded to

the piece of tarpaulin cloth, said piece being in turn applied to the tarpaulin by hot air fusion.

6. A tarpaulin comprising a fabric coated with a plastics material, preferably PVC, polyamide or polyprene, and provided with a decoration of a reflecting material, CHARACTERIZED in that it carries a piece of reflecting sheet of the glass bead type or the metallized or sealed prism type applied directly to the tarpaulin by adhesion and anchored to the tarpaulin and protected by an overlying transparent flexible film of a polymeric material compatible with the plastics coating of the tarpaulin, the edges of said film extending beyond those of the reflecting sheet and being high frequency welded to the tarpaulin.

7. A method of providing a tarpaulin comprising a fabric coated with a plastics material, preferably PVC, polyamide or polyprene, with a decoration of a reflecting material, CHARACTERIZED in that a reflecting sheet is anchored to a piece of tarpaulin cloth, whose plastics coating is of the same type as or is compatible with that of the tarpaulin, by high frequency welding or heat application, and then the piece of tarpaulin cloth provided with reflecting sheet, optionally formed in the desired shape, is applied to the tarpaulin by hot air fusion.

8. A method according to claim 7, CHARACTERIZED in that the tarpaulin comprises a polyester fabric coated with PVC.

9. A method according to claim 7 or 8, CHARACTERIZED in that the reflecting sheet is a retroreflecting sheet of the glass bead type comprising a large number of fine glass beads embedded with a specular base in a plastics sheet, or of the prism (cube corner) type with a large number of prisms impressed in the surface of a plastics sheet so that light is reflected through the sheet.



10. A method according to any of claims 7-9, CHARACTERIZED in that the reflecting sheet is a retroreflecting PVC sheet of the prism type.

5 11. A method according to claim 7, CHARACTERIZED in that a reflecting sheet of the glass bead type or the metallized or sealed prism type is applied to a piece of tarpaulin cloth by means of an adhesive and is anchored to said piece and protected by placing a transparent flexible film of a  
10 polymeric material compatible with the plastics coating of said piece on top of the reflecting sheet with its edges extending beyond those of the reflecting sheet and high frequency welding it to the piece of tarpaulin cloth along the edges, and then the piece of tarpaulin cloth provided  
15 with reflecting sheet is applied to the tarpaulin by hot air fusion.

12. A method according to any of claims 7-11, CHARACTERIZED in that the piece of tarpaulin cloth provided with reflecting  
20 sheet is applied to the tarpaulin by means of a hot air apparatus (heat gun), whose hot air jet is introduced between the underside of the tarpaulin cloth and the surface of the tarpaulin so that the tarpaulin cloth fuses to the tarpaulin without the reflecting sheet being damaged.

25 13. A method according to claim 12, CHARACTERIZED in that the temperature of the hot air jet is 400-600 °C.

14. A method of providing a tarpaulin comprising a fabric  
30 coated with a plastics material, preferably PVC, polyamide or polyprene, with a decoration of a reflecting material, CHARACTERIZED in that a reflecting sheet of the glass bead type or the metallized or sealed prism type is applied directly to a tarpaulin by means of an adhesive and is  
35 anchored to the tarpaulin and protected by placing a transparent flexible film of a polymeric material compatible with the plastics coating of the tarpaulin on top of the

reflecting sheet with its edges extending beyond those of the reflecting sheet and high frequency welding it to the tarpaulin along the edges.

- 5     15. A piece of tarpaulin cloth to which a reflecting sheet is anchored by high frequency welding or heat application to be applied as a reflective decoration to a tarpaulin by hot air fusion.
- 10     16. A piece of tarpaulin cloth according to 15 wherein the reflecting sheet is a retroreflecting sheet of the glass bead type comprising a large number of fine glass beads embedded with a specular base in a plastics sheet or of the prism (cube corner) type with a large number of prisms
- 15     impressed in the surface of a plastics sheet so that light is reflected through the sheet.
17. A piece of tarpaulin cloth according to claim 16 wherein the reflecting sheet is a retroreflecting PVC sheet
- 20     of the naked prism type.
18. A piece of tarpaulin cloth according to claim 15 to which a reflecting sheet of the glass bead type or the metallized or sealed prism type is applied by adhesion and
- 25     anchored to said piece and protected by an overlying transparent flexible film of a polymeric material compatible with the plastics coating of said piece, the edges of said film extending beyond those of the reflecting sheet and being high frequency welded to said piece.
- 30     19. A piece of tarpaulin cloth according to any one of claims 15-18 being in the form of a narrow band.

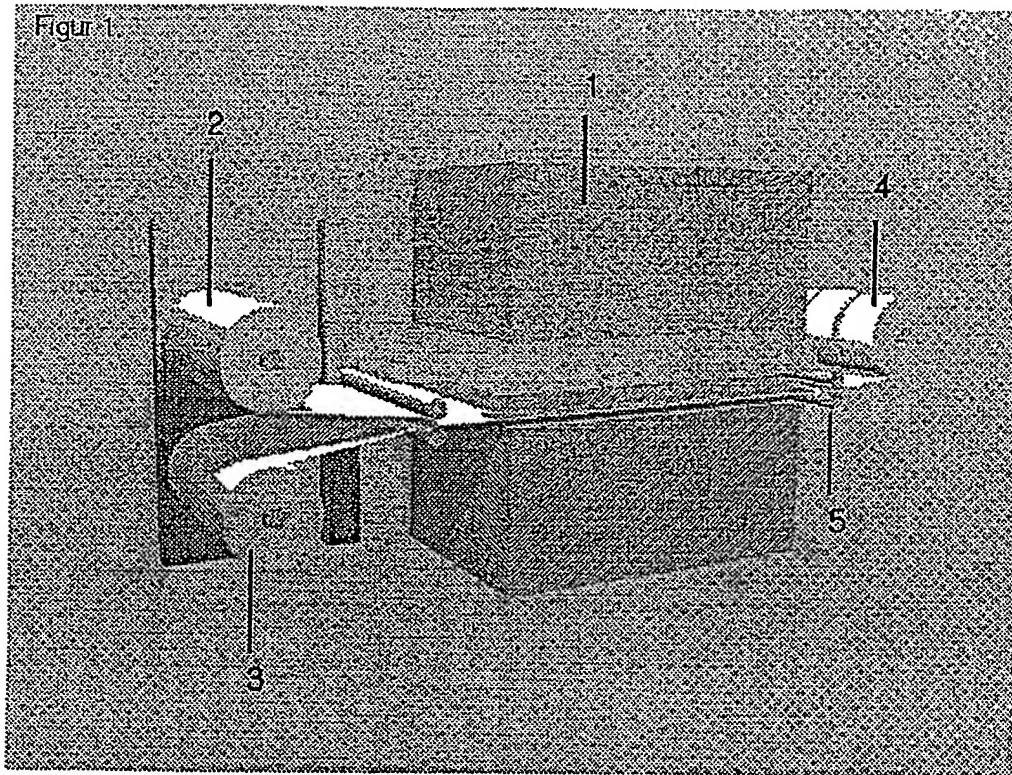


FIG. 1

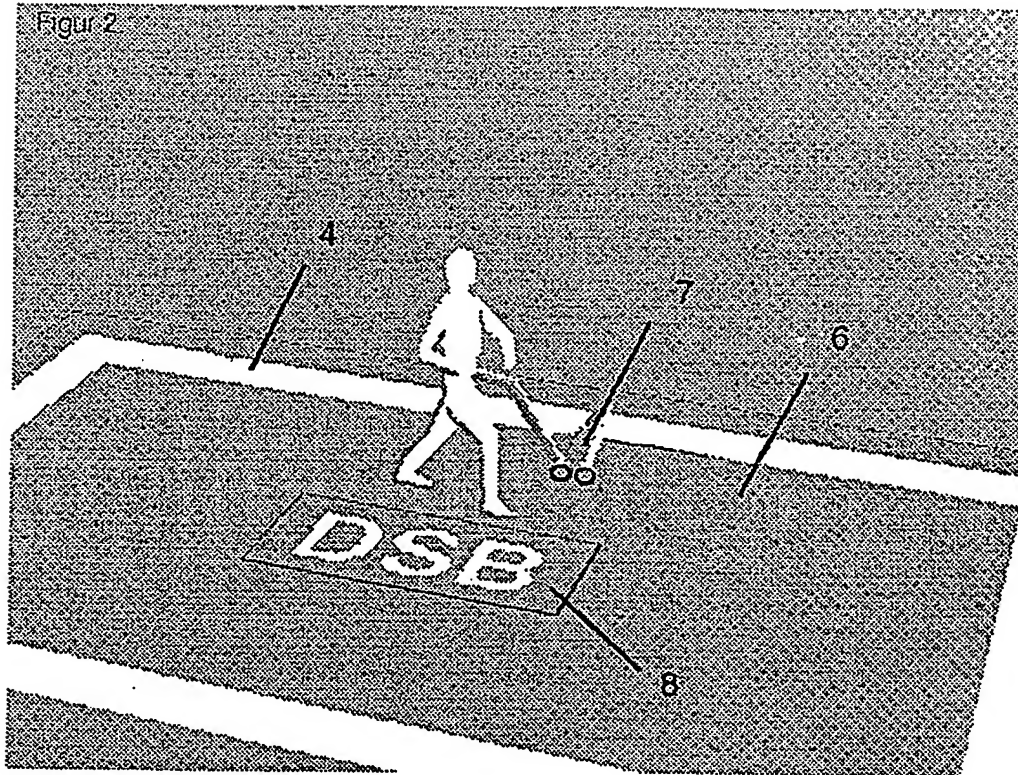


FIG. 2

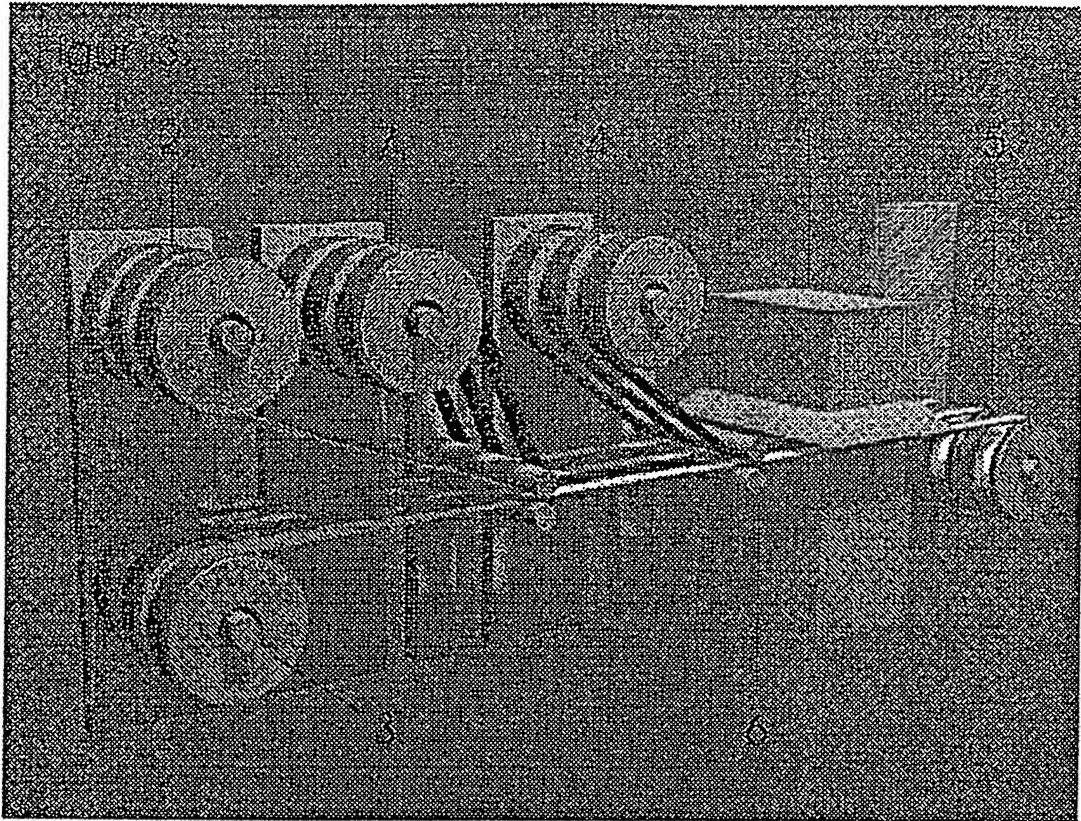


FIG. 3

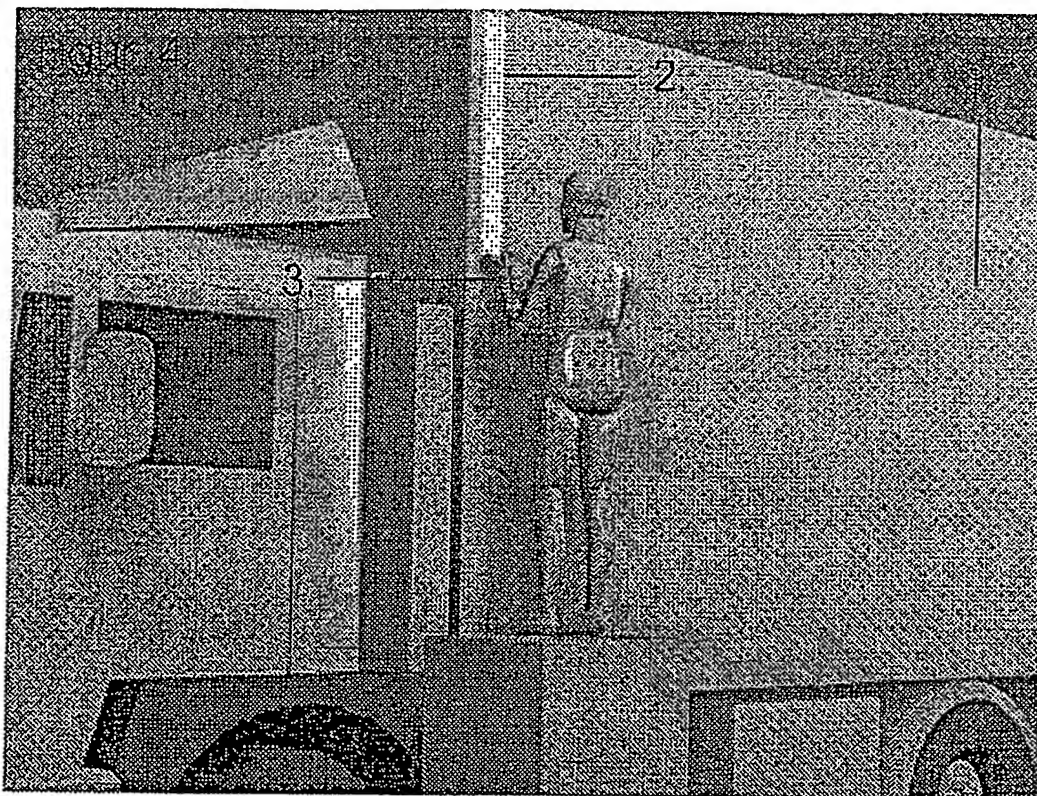


FIG. 4

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 92/00367

## A. CLASSIFICATION OF SUBJECT MATTER

IPC5: B44F 1/02, D06N 7/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: B44F, B60P, D06N, D06Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SE, B, 365163 (MINNESOTA MINING AND MANUFACTURING COMPANY), 18 March 1974 (18.03.74), the whole document	1-17
P,A	GB, A, 2255313 (SWINTEX LIMITED), 4 November 1992 (04.11.92), figure 2, claim 13	6,14

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

17 March 1993

Date of mailing of the international search report

22.03.1993

Name and mailing address of the ISA/  
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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 92/00367

## Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

### 1 Claims 1-5, 7-13 and 15-17:

A tarpaulin with a decoration comprising a reflecting material on a piece of tarpaulin cloth applied to the tarpaulin by hot air fusion, a method of producing the tarpaulin cloth to be applied to a tarpaulin by hot air fusion.

### 2 Claims 6 and 14:

A tarpaulin with a decoration of a reflecting sheet being applied directly by adhesion and anchored by an overlying film which is applied to the tarpaulin by high frequency welding and a method of producing the tarpaulin by high frequency welding.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.



INTERNATIONAL SEARCH REPORT  
Information on patent family members

26/02/93

International application No.  
PCT/DK 92/00367

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
SE-B- 365163	18/03/74	BE-A- 744645 DE-A- 2003793 FR-A- 2037319 GB-A- 1303103 NL-A- 7000724	10/07/70 06/08/70 31/12/70 17/01/73 23/07/70
GB-A- 2255313	04/11/92	NONE	